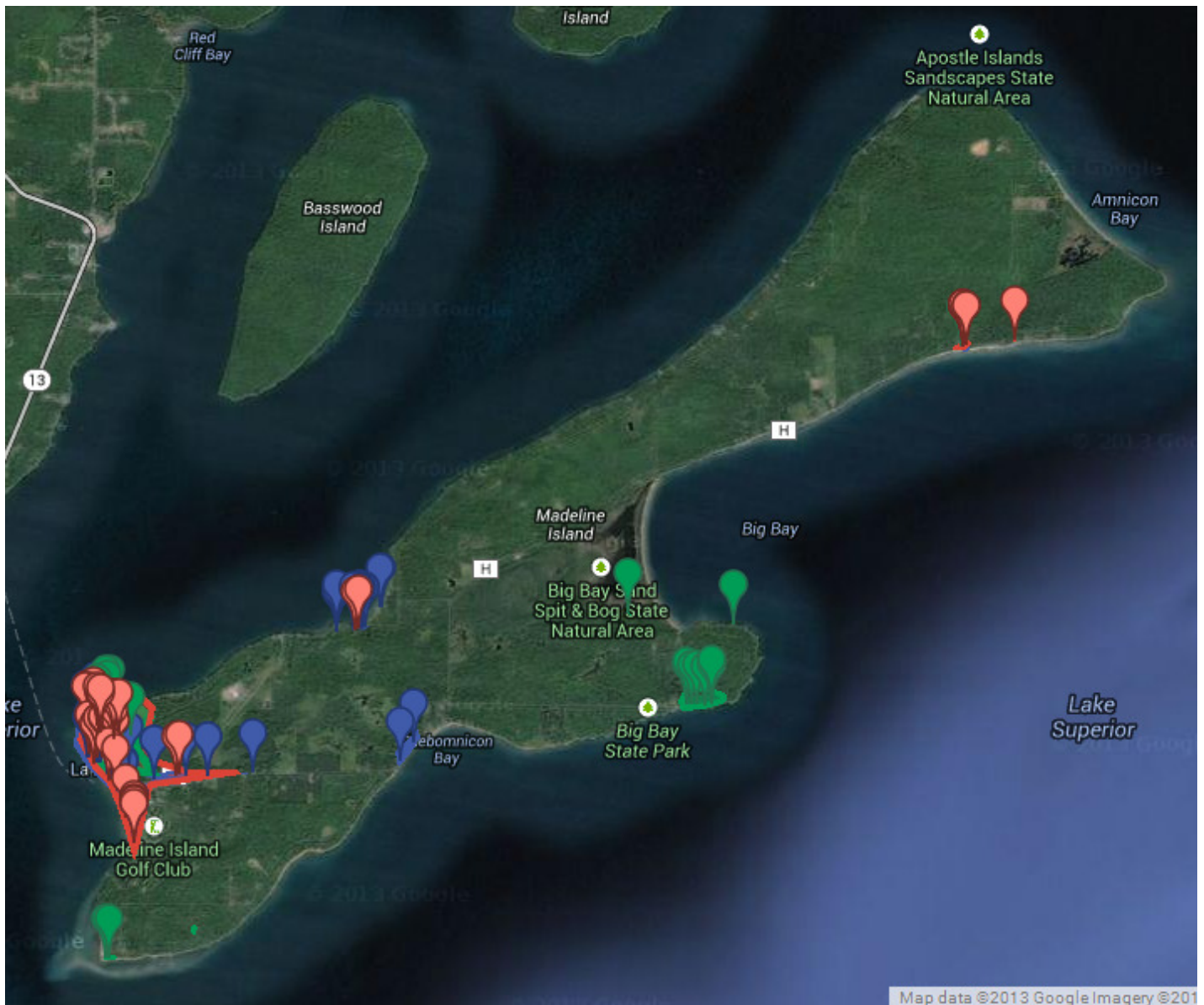


INVASIVE PLANT SPECIES MANAGEMENT PLAN

MADELINE ISLAND

June 2013



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Other Material Referenced from “A field Guide to Invasive Plants in Wisconsin”, Wisconsin DNR 2010

Prepared for: The Town of La Pointe and Madeline Island Wilderness Preserve

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INTRODUCTION

Madeline Island is located in Northern Wisconsin and is the largest of the 22 islands in the Apostle Islands archipelago. Madeline Island has been inhabited by Native Americans, fur traders, and missionaries, and has flown the flags of three different nations. Hundreds of years before European contact, Native Americans like the Ojibwe made this island their home.

The island is located 2.5 miles from the mainland of Wisconsin and is surrounded by the cold waters of Lake Superior. The island is approximately 15 miles long, 3 miles wide, and has an elevation of about 650 feet. There are many low-lying areas that cause the soil to be highly saturated at times, and in many places standing water is common. A large lagoon and bog lake are also located on the island. Plant and animal life is highly diverse due to the presence of both lowland environments and well-drained areas. The majority of the island is heavily forested with mature stands of trees. With the exception of the southern tip of the island where the town of La Pointe is located, there are only a few roads on the island.

These mature stands of pristine woods, however, are in danger. Recent climate change patterns have allowed invasive plants to spread to new areas. Ecosystems that were not favorable for certain invasive plants before are changing and now becoming ideal for some species. Even more, native plant species are starting to struggle in places they once thrived, and these important species need all the help they can get.

When native plant species are removed, it is more likely that invasive plant species will take their place than native plants. Invasive plants are called invasive because they are well adapted to transport, establish, and takeover of new areas. Native species are not used to this level of competition and usually cannot compete. To make matters worse, Madeline Island is a tourist hot spot and brings in visitors from not just hundreds of miles away, but from all corners of the United States, and even the world. Invasive plant seeds are exceptionally easy to spread, and people and their pets and vehicles can easily unknowingly transport these plants to the island.

This management plan will focus on buckthorn, barberry, honeysuckle, purple loosestrife, spotted knapweed, tansy, Japanese knotweed, garlic mustard, and leafy spurge. However, there are far more invasive plants not mentioned. Some plants haven't made it to the island yet, and others may be present but at low enough levels that they haven't yet been detected.

***Non-native plants and invasive plants are not the same. A plant can be present, and not originally from where it is now, and not be a problem. An example would be most plants found in a garden. A plant becomes a problem when it is non-native **AND** has the potential to replace native plants and harm plant/animal communities physically and aesthetically. An example would be bush honeysuckle or buckthorn.

Invasive Plant Management on Madeline Island

Despite dominance of invasive plants on some portions of the island, the majority of the island is still relatively uninfested. Therefore, it should be the goal of both the Madeline Island Wilderness Preserve and Town of La Pointe to keep infested areas from spreading. Once infested areas are identified, efforts should then be made to reduce the density of the invasive plants to a manageable level. Small, isolated populations should not be overlooked. If these populations are not eradicated first, it is likely that they, too, will become heavily infested.

Preventing the spread of both new and old invasive plants should be considered when carrying out maintenance activities such as mowing and construction. Preventative measures for reducing the spread of invasive species such as using washed, clean equipment and incorporating weed-free products should become common practice. The most cost-effective approach to managing invasive plants is through prevention. One plant going to seed can result in 7-30 years of control activity.

During the first week of June, July, August, and September, at a minimum, monitoring along all roads throughout the island should be done. Better monitoring would not only include monitoring along roads, but also any other right-aways, trails, construction areas, campgrounds and visitor centers.

Working With Land Owners

Invasive plants have no boundaries and because of this, these plants are found on both public and private lands. Most of the public land on the island belongs to either the town of La Pointe or Madeline Island Wilderness Preserve. Both of these public entities have already had invasive plant removal and should continue to have plants removed. The biggest obstacle is gaining access to private land. In the summer of 2013, approximately 40 private land owners signed participation agreements to allow invasive plants to be removed from their property. Many other land owners were contacted but for various reasons, a participation agreement was not received. Face to face interactions with land owners showed the best results for gaining permission. Most land owners were very interested and willing to participate in the removal of the plants. However in some cases, negotiation was necessary in order to secure permission to work on private properties.

Locations on properties that had invasive plants located in areas where the removal of that plant could have the potential to cause erosion required extra consideration. After talking with land owners, the best solution was deemed to use rotational cutting by removing only a small portion of the total number of plants in that particular area. Then in the following year, more plants could be removed, until over the course of 2-4 years, all the invasive plants would be removed. In these areas, it is important to NOT remove the entire plant and roots due to the added probability of causing erosion. The amount of work and timeline that would be used would be highly dependent on each location considering the natural variables such as soil type, density of invasive plants, and landscape.

In other locations, private land owners were concerned about losing the privacy that the invasive plants were providing to their property. A couple different options were brought forth. One option could be to remove plants in the same rotational cutting method used in areas of concern with erosion. This could result in a more gradual change of invasive and native plant densities. Another option could be to incorporate the planting of native plants in the place of the invasive plants.

Another issue that arose while gaining permission was removing plants that were ornamental, or had some other value. In some situations, a landowner might be willing to allow the removal of all invasive plants on the property with the exception of one particular spot. Although this is not the ideal situation, it is substantially better to gain permission to remove the majority of invasive plants than to be able to remove none at all. The hope in these situations should be that in future years, the invasive plants would be allowed to be managed through more negotiating with land owners.

In all cases, it is extremely important to work with landowners. Contact information to reach the landowner should always be on file so that if a situation arises, solutions can be found so that both parties' needs are met. If private land owners are unhappy with the removal process of the invasive plants, they have the right to cancel the participation agreement, thus making work on neighboring properties far less effective. Properties with invasive plants that are not allowed to be removed will become long term seed banks that will continue to spread the unwanted plants.

Priority Objectives

In early 2013, a statewide strategic plan for invasive species was developed. Thirty-two speakers representing over fifteen organizations joined together and recommended the following priority objectives be adopted by all state, federal, and local groups to make cost-effective improvements in invasive species management in Wisconsin.

Prevention- Education and outreach to the public about the impacts invasive species have is the first step. With better education, people can make better choices when dealing with these invasive species and therefore reduce the likelihood of their spread.

Detection- Work to increase detection of invasive species can be done by using networks of partners, the use of information and technology, and putting more effort into current research and mapping. The earlier a species can be detected, the more likely its spread will be contained.

Rapid Response- Create a dedicated fund, and detailed management plan to react to new and old invasive species. Half of the battle is developing the funding and management plan. Once those are established, it's then only a matter of acting.

Control- Secure adequate long-term funding to control established invasive species. Once you have reached this point, it's now time to put the planning and funding into action.

Invasive Species Rule - NR 40

In 2001, the Wisconsin Legislature directed the Department of Natural Resources to establish a statewide program to control invasive species, and to promulgate rules to identify, classify, and control invasive species for purposes of the program. By 2004, the Wisconsin Council on Invasive Species formed to assist DNR with this task.

As a result, on September 1, 2009, the DNR created Wisconsin's Invasive Species Identification, Classification and Control Rule, Chapter NR 40, Wis. Adm. Code was created. The rule helps citizens learn to identify and minimize the spread of plants, animals, and diseases that can invade our lands and waters and cause significant damage.

Invasive species are non-native plants, animals, and pathogens whose introduction cause or are likely to cause economic or environmental harm or harm to human health.

- Invasive species can alter ecological relationships among native species and can affect ecosystem function and structure, economic value of ecosystems, and human health.
- There are many non-native plants that are invasive in forests, grasslands, wetlands, lakes and rivers. They displace native species and disrupt wildlife habitat.
- Invasive species threaten Wisconsin's traditions, environment and economy in every corner of our lands and waters.

Without this rule, different invasive species groups are not treated consistently, making concerted action less likely. Federal and state laws provide regulations and resources for early detection and quarantine for invertebrates and disease-causing organisms. State law limits the release of non-native fish and other vertebrates into the wild. However, there are very few federal or state laws that relate to non-native plants. Local noxious weed ordinances are erratic and often uneven in their implementation. This rule allows the Department to have more consistent authority and actions between the species groups and to provide one clear, state-wide law that is reasonable and feasible.

Pesticide Regulation and Use

If pesticides are determined to be the safest, most effective method for control, staff, and contractors must follow all state and federal regulations governing pesticide use.

State and Federal Pesticide Regulations

As per the Federal Insecticide, Fungicide and Rodenticide Act (1947, USDA), purchase, storage, application, and disposal of all pesticides must be done in accordance with the product label. Occupational Safety and Health Administration (OSHA) requires that the label information as well the product Material Safety Data Sheets (MSDS) be immediately available when the product is in use and accessible when with the product is stored.

Workers will follow the regulations set forth by the State of Wisconsin Department of Agriculture regarding the purchase, storage, application and disposal of pesticides and pesticide related materials. According to current (2008) guidelines, all applicators that purchase, mix and load, or apply **restricted-use pesticides** must be licensed by the State. Employees must pass a certification exam every five years and renew their license annually. Employees who use general-use pesticides are not required to hold licenses. However, it is encouraged that at least one supervisor retains a pesticide license and that all individuals receive training on proper use of pesticides.

HERBICIDE MANAGEMENT

Herbicide Use Precautions:

- Read and place all Material Safety Data Sheets (MSDS) and labels for pesticides in an Herbicide Binder. If a new herbicide is being used, alert the Supervisor so appropriate documentation can be kept.
- Take the Herbicide Binder to the field site each day. The binder will include copies of MSDS and labels, all necessary information for proper herbicide handling, mixing, and application, and herbicide application forms for daily record keeping.
- Always wear protective clothing when handling herbicides or herbicide equipment.
- Maintain and carry emergency first aid supplies for herbicide application.
- Maintain and carry emergency spill response kit for herbicide application.
- Never make guesses when dealing with herbicides. Ask questions. Protect yourself and the environment.

Inspection and Repair of Equipment:

Daily cleaning, inspection, and repair of equipment will occur. Each applicator is responsible for his/her spray equipment and safety gear. This includes all equipment and supplies used on a daily basis.

Do not use faulty or damaged equipment. Repair or replace it immediately. Tag or label any equipment not suitable for use and inform the supervisor.

Calibration:

Before any herbicide application takes place all equipment will be calibrated. The purpose of calibration is to determine how much chemical is being applied on a per acre basis and to establish the rate of application. It is important that the same spraying technique is used consistently because variations will alter the application rate. It will be necessary to recalibrate throughout the season to ensure accuracy.

Herbicide Transport:

All herbicides, either as concentrate or mixed for application, must be transported securely and in secondary containment. Under no circumstances will herbicides be allowed in passenger areas of vehicles. Herbicides must be physically separated from PPE and all other items (tools, field equipment, personal gear) while in transport.

Herbicide Handling, Mixing and Application:

All sprayers will be tagged at all times. Information on the tag will include contents and conditions (examples: 3x rinsed, broken nozzle - do not use, X% herbicide solution, etc.)

Only mix a desired amount of herbicide that can be used in a timely manner. Ideally, little to no herbicide should be un-used at the end of the work day. Active ingredients in mixed herbicide that is not used immediately can become inactive and thus cause the herbicide to become ineffective after being un-used for a period of time.

All herbicides will be applied in a manner consistent with the herbicide label and state laws. ***Always read the label every time.*** All MSDS and labels can be found in the Herbicide Binder. When you are applying an herbicide, it is important to have a firm understanding of the chemical. Know what it can do to targeted and non-targeted plants, animals and humans. Required PPE must always be worn while handling, mixing and applying herbicide. Again, minimum PPE includes: long pants, long sleeves, leather boots, rubber gloves, and eye protection. Additional PPE may be required as dictated by a supervisor or the pesticide label.

In addition to understanding the herbicide and protecting yourself by wearing appropriate PPE, take the following precautions when handling herbicides:

- Do not mix herbicides within 100 ft of a well or near a water source (unless the site is aquatic with aquatic registered herbicide).

- Use care and supervision while mixing and filling spray units.
- Never allow the filler hose/nozzle to contact the chemical or spray tank.
- Mix all solutions with the spray tank in a containment tub.
- Transport herbicides in secured containment tubs outside of any passenger area.
- Mix all herbicides according to label specifications. Document type, amount and concentration of herbicide mixed in an herbicide log.

Sprayer Cleaning/Triple Rinsing:

Before storage (even short-term) or switching herbicides, all application equipment must be empty and cleaned. This is achieved by triple rinsing and is done in appropriate PPE. Empty herbicide concentrate containers must be triple rinsed and properly disposed of immediately. Puncture the container so it cannot be used, and dispose of it according to the label. Rinse all spray equipment before storage and clean before repair.

Schedule work to attempt to empty spray equipment by the end of spray hours; in the event this does not happen, tag equipment to indicate contents. Use protective clothing when rinsing; rinse your gloves each day.

The procedure for triple-rinsing backpack sprayers is:

- Fill empty backpack with 1 gallon of clean water.
- Agitate tank then spray out remaining rinsate in the same manner as you would apply herbicide, in a designated area.
- Fill tank with 1 gallon of clean water and spray out rinsate.
- Repeat process using 1 gallon of clean water.

At times it is necessary to add a cleaner to the second rinse to ensure a clean tank. This is commonly done when switching to a different herbicide. Check sprayer manual for appropriate cleaner recommendations. Some chemical cleaners may be detrimental to sprayer parts.

Herbicide Inventory:

The purpose of the inventory is to track herbicide usage and shelf-life of stored agents. An annual inventory of herbicide cabinets should be completed at the start and end of the field season and whenever additional herbicide is purchased. A copy of the inventory must be accessible in the herbicide cabinets. It should list:

- Trade name/common name of herbicide or agent (i.e., surfactant)
- Amount
- Date of inventory
- Date of purchase. If no date is on container, label container 'Inventoried MM/DD/YY'
- Name of person performing the inventory.

Herbicide Disposal:

Herbicide left over that can not be used or disposed of safely should be set aside and clearly labeled "HAZARD WASTE." One of the best solutions to disposing of the hazard waste can be to register in a local clean sweep program. These typically occur 2-3 times per summer in the Ashland to Cornucopia area. The registration is free and disposal is \$0-\$3 / lbs of fluid.

For information about local clean sweep programs, contact the Bayfield County UW-Extension at (715)-373-6104.

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Other Safety Requirements:

OSHA regulations require anyone working along main roads to wear ANSI Class II or III vests.

When using a chainsaw, protective chaps, helmet, ear protection, eye protection, and chainsaw boots are required to be worn.

DESCRIPTION OF CRITICAL INVASIVE PLANT SPECIES

Common Buckthorn (*Rhamnus cathartica*)

Description

Common buckthorn is a shrub or small tree that grows up to 20-25 feet tall often with several stems and a spreading crown. The bark is generally gray to brown with prominent light-colored lenticels. The most obvious sign of buckthorn is the orange heartwood that is shown when the trunk of the tree is cut. Another prominent feature is the small sharp spines that are located at the end of twigs sometimes, but not always. The leaves are mostly opposite and shaped ovular with tiny teeth and prominent veins that curve towards the tip. The leaves stay green into the fall, usually later than most native plant species. Flowers are greenish yellow. They are usually small and inconspicuous yet fragrant consisting of 4 petals clustered at the leaf axils and can be seen blooming May-June. Buckthorn is primarily spread by birds from eating its seeds. The female trees produce these seeds which are abundant clusters of round black, pea sized fruit which ripens in late summer.



Ecological Threat

Buckthorn leafs out very early blocking out sunlight that would otherwise be available for native spring wildflowers and also retains its leaves late into the fall similar to bush honeysuckles. It forms dense, even aged thickets, reducing light availability for understory species and preventing native tree regeneration. Like the honeysuckles, this plant is used as ornamentals to shelter private property from road ways for example. However when the plant spreads to the forest, it becomes a problem.

Habitat

Buckthorn invades forests, woodlands, oak savannas, prairies, fields, and roadsides.

Status in Wisconsin

Restricted - Invasive species that are already established in the state and cause or have the potential to cause significant environmental or economic harm or harm to human health and includes established nonnative fish and crayfish, fish in the aquaculture trade, fish in the aquarium trade, and non-viable fish species.

Distribution on the Island

Buckthorn is currently extremely abundant on the SW portion of the Island which is where the town of La Pointe is located. However after about 5 miles NE of town, the plant seems to disappear. This is because the plant has only in the last 10-15 years been rapidly spreading out of control. There is one isolated patch about 9 miles north of town on Big Bay Rd. on private property. The patch appears to not have spread more than ½ a mile from the center of the infestation. The distribution of buckthorn on the island is largely due to birds eating the seeds. The spread is in the early stages yet, and, if dealt with properly, could be lowered to a more manageable level.

Past Control Efforts

Since 2008, chemical use of Garlon 4 and Tahoe 4E has been used in stump treatments as well as foliar spraying. The Madeline Island Wilderness Preserve has organized several events clearing buckthorn and barberry, and in 2011 an Americorps crew also spent 8 -10 weeks in the fall clearing buckthorn and barberry. In the summer of 2013, buckthorn was again targeted. Work was primarily focused on isolated populations NE of town. The large infestation 9 miles north on Big Bay Rd. was completely removed but seedlings are likely to return so monitoring and control as needed should continue there especially. Other work has also been done on mainly fruit bearing trees in some properties in town.

Background

Buckthorn is native to Europe and Asia and was introduced to North America in the 1800's as an ornamental hedge and windbreak. On Madeline Island, it is unsure when exactly the plant came onto the island, but it did not become a real concern until about 2007. Although the species appears to be well established on the southern end

of the island, the spread is has not moved more than a few miles from the town area, with the exception of one isolated population near the north end of the island.

Mobility/Spread

This species spreads mainly by seed dispersal. Birds increase the mobility of these seeds to new areas quickly. Because of this, flight paths along corridors like trails, roads, and field edges are usually the most infested along with under power lines and other mature trees. Plants that are cut will re-sprout in multiples if not treated within 2 hours.

Manual and Mechanical Control

It is possible to hand pull small plants. For larger plants, digging and or use of a leverage tool may be necessary. In some situations, this may be a better option than using herbicide, such as when a single plant is in a yard. However, in larger infestations, this may not be practical and may also cause a large disturbance in the soil that could then lead to the release of more invasive plants. Burning sprouting seedlings in the spring can be another effective option.

Biological Control

There is currently no known feasible way of controlling buckthorn with biological control.

Chemical Control

Options include foliar spray, cut-stump, and basal bark treatments. For foliar application, it is suggested that an herbicide with metsulfuronmethyl or triclopyr be used. For cut-stump and basal bark applications, treatments with triclopyr or glyphosate work best.

Management Options

Even though buckthorn has established itself on the southern end of the island, the majority of the rest of the island is still uninfested. Because of this, efforts should be focused first on removing any isolated populations of both seedlings and mature trees beyond the southern end of the island. Remaining efforts should focus on removing mainly mature trees on the edge of the infestation and then inward. After the mature plants have been removed, then the focus should be shifted to removing seedlings in the already heavily infested area.

Japanese Barberry (*Berberis thunbergii*)

Description

Japanese barberry is a small and dense spiny shrub that typically is 2-3 feet tall. In some circumstances the plant can reach up to 6 feet tall and 6 feet wide. The branches appear reddish brown and deeply grooved and somewhat zigzag in form. At each node, there is a straight, single, sharp spine. The inner bark wood is bright yellow. Leaves are ovular in shape and small in an alternating growth. May be green to blueish green, or dark reddish purple depending on the cultivar. The fruit/seeds are small, oblong, and bright in appearance occurring on narrow stalks. Berries mature in mid summer and persist on shrub into winter.



Ecological Threat

Barberry has the ability to alter soil pH and nitrate levels, creating conditions that are beneficial for its own growth. It is very invasive and widespread in states further east. However, in Wisconsin, the populations are more localized.

Habitat

This plant invades forests, woodlands, oak savannas, and fields. Typically it prefers well-drained soils.

Status in Wisconsin

Not yet regulated in Wisconsin.

Distribution on the Island

Like buckthorn, barberry was introduced to the island as an ornamental plant, and then has been spreading ever since. On the south portion of the island, the town of La Pointe is heavily infested, however, after only about 5 miles, there appears to be little to no plants present towards the north end of the island.

Past Control Efforts

Since 2008, chemical use of Garlon 4 and Tahoe 4E has been used in stump treatments as well as foliar spraying. The Madeline Island Wilderness Preserve has organized several events clearing buckthorn and barberry and in 2011 an Americorps crew also spent 8 -10 weeks in the fall clearing buckthorn and barberry.

Background

Japanese barberry was introduced from Japan around 1875. It is now commonly planted for ornamental reasons as well as for wildlife and erosion control.

Mobility/Spread

Spreads vegetatively and by seed dispersal from birds. Horizontal lower branches that reach the ground can root freely upon contact. Dispersal by birds is the main way this plant is spread quickly.

Manual and Mechanical Control

It is possible to hand pull or dig plants in the early spring using a hoe and or leverage tool; however, cutting the plant without treating will lead to resprouting. Controlled burns in the early spring or late fall can be used to kill seedlings.

Biological Control

There is currently no known feasible way of controlling barberry with biological control.

Chemical Control

By using a foliar spray with metsulfuronmethyl, triclopyr, or glyphosate, barberry can be effectively controlled. Cut-stump treatments are also effective with glyphosate or triclopyr. However in large infestations, cut-stumping may be impractical.

Management Options

In order to best control barberry on Madeline Island, efforts should first be focused on targeting plants outside of the heavily infested area on the southern portion of the island to keep the plant from spreading more. After that, targeting the infested area itself should become the priority. Using a foliar spray is the best option for controlling large infestations. However, in situations where few, non-randomly orientated plants are present, either manual/mechanical methods and or cut stump treatments should be considered.

Bush Honeysuckles (*Lonicera Maackii*, *L. x bella*, *L. morrowii*, *L. tatarica*)

Description

Bush honeysuckles are typically dense multi-stemmed shrubs ranging from 6-12 feet tall. Older stems may have bark that seems shaggy and even peeling in appearance. The mature stems will have hollow dark pith when cut. Leaves are untoothed and opposite. They are shaped ovular or oblong and come to a point. The flowers are fragrant and tubular, usually arranged in pairs at leaf axils. Plants bloom mid to late spring and can be reddish pink or white, turning yellow with age.



Ecological Threat

This plant is similar to other invasive plants like buckthorn that can inhibit their surrounding plants. Bush honeysuckles alter their habitats by depleting soil moisture and nutrients, and possibly releasing allelopathic chemicals that inhibit growth of other plants. This plant can also form dense even-aged thickets. This is why landowners often use this plant as an ornamental to shelter private property from roadways for example. However, when the plant spreads to the forest, it restricts light availability for native understory species regeneration.

Habitat

Bush honeysuckles invade forest edges, woodlands, fields, pastures, fens, bogs, lake shores, and road ways.

Status in Wisconsin

Restricted - Invasive species that are already established in the state and cause or have the potential to cause significant environmental or economic harm or harm to human health and include established nonnative fish and crayfish, fish in the aquaculture trade, fish in the aquarium trade, and non-viable fish species.

Distribution on the Island

Invasive honeysuckle has established itself on the island. It appears to mainly be found at the southern end of the island in and around the town of La Pointe. It is very abundant both as an ornamental and growing wild. After about 5 miles north of town, the appearance of the plant is mostly absent. In numerous places, the honeysuckle is worse than some of the bad infestations of buckthorn.

Past Control Efforts

Prior to 2013, there was no control of bush honeysuckles on the island. In the summer of 2013, bush honeysuckles were added to the list of invasive plants to be focused on for Madeline Island. Since then honey suckle has been included in control efforts of buckthorn and barberry.

Background

Bush honeysuckles are native to Asia. These species were introduced to North America in the late 1800s and 1900s.

Mobility/Spread

The spread of bush honeysuckle is generally accomplished by birds. Fruits are consumed readily upon ripening during summer. Bush honeysuckle plants commonly are found growing under tall shrubs or trees that act as perch areas for birds. Seeds appear to need a cold stratification period in order for them to break dormancy. Seedlings establish in areas of sparse herbaceous vegetation and can tolerate moderate shade.

Manual and Mechanical Control

Honeysuckle can be controlled by hand pulling, but only on smaller plants due to its fibrous root system. A leverage tool can be used on some larger plants. Cutting without treating will lead to resprouting. Controlled burns in the spring can remove seedlings.

Biological Control

There is currently no known feasible way to biologically control honeysuckle.

Chemical Control

A foliar spray can be used with metsulfuronmethyl, triclopyr, or glyphosate in the early spring prior to leaf out of native species. Cut-stump treatments with glyphosate or triclopyr are also effective against honeysuckle.

Management Options

Honeysuckle is in the early stages of becoming a large infestation on the island. Its origins on the island are similar to other main invasive species like buckthorn and barberry. Honeysuckle first arrived as an ornamental, and then spread to the nearby woods via birds and other animals. In the majority of places that buckthorn and barberry was found, honeysuckle was also present. In some cases, the honeysuckle was as prevalent as the buckthorn in badly infested areas. In other places, it was infesting areas that even buckthorn and barberry were not. It is not a matter of if honeysuckle will start infesting the island; it has already begun and is well under way. If honeysuckle is not dealt with the same time the other invasive species are dealt with, it will be “released” by the removal of the other invasive plants and be able to spread farther and faster with the absence of its competitors. Control of buckthorn, barberry, and honeysuckle should be undertaken simultaneously.

Purple Loosestrife (*Lythrum salicaria*)

Description

Purple loosestrife is a nuisance exotic weed that is extremely invasive in Wisconsin's wetlands. Although colorful, this plant is extremely undesirable because it prevents many desirable native wetland plants from becoming established. Purple loosestrife is a



perennial herb 3-7 feet tall with a dense, bushy growth of 1-50 stems. Showy flowers vary from purple to magenta, possess 5-6 petals aggregated into numerous long spikes, and bloom from July to September. Leaves are opposite, nearly linear, and attached to four-sided stems without stalks.

Ecological Threat

The plant's ability to adjust to a wide range of environmental conditions gives it a competitive advantage; coupled with its reproductive strategy, purple loosestrife tends to create monotypic stands that reduce biotic diversity. Purple loosestrife displaces native wetland vegetation and degrades wildlife habitat. As native vegetation is displaced, rare plants are often the first species to disappear. Eventually, purple loosestrife can overrun wetlands thousands of acres in size, and almost entirely eliminate the open water habitat. The plant can also be detrimental to recreation by choking waterways.

Habitat

This plant's optimal habitat includes marshes, stream margins, flood plains, sedge meadows, and wet prairies. It is tolerant of moist soil and shallow water sites such as pastures and meadows, although established plants can tolerate drier conditions.

Status in Wisconsin

Restricted - Invasive species that are already established in the state and cause or have the potential to cause significant environmental or economic harm or harm to human health and includes established nonnative fish and crayfish, fish in the aquaculture trade, fish in the aquarium trade, and non-viable fish species.

Distribution on the Island

Loosestrife is known to occur at maintenance levels in and around the town of La Pointe. The largest population is found in the slough system of the town marina.

Past Control Efforts

For the past 15 years, GLIFWC has treated purple loosestrife chemically. In the summer of 2013, biotic control with beetles for the first time by GLIFWC occurred. Upon releasing the beetles in the marina however, it was discovered that the same species of beetle being introduced had already been established on loosestrife plants in the marina. Regardless, the new beetles were also released on the plants to help increase the population of beetles.

Background

Purple loosestrife was first introduced as a garden perennial from Europe during the 1800s. The plant was first detected in the Midwest in the early 1930s, but remained uncommon until the 1970s. It is now widely dispersed throughout the Midwest.

Mobility/Spread

Purple loosestrife spreads mainly by seed, but it can also spread vegetatively from root or stem segments. A single stalk can produce from 100,000 to 300,000 seeds per year. Seed survival is up to 60-70%, resulting in an extensive seed bank. The absence of natural predators also contributes to its proliferation in North America.

Manual and Mechanical Control

It is possible to effectively control purple loosestrife by digging out the rhizome completely. However, any remaining rhizome will resprout. After removed, the plants must be removed from the site or they will resprout. Mowing has little effect.

Biological Control

While herbicides and hand removal may be useful for controlling individual plants or small populations, biological control is seen as the most likely candidate for effective long-term control of large infestations of purple loosestrife. As of 1997, a couple insect species from Europe have been approved by the U.S. Department of Agriculture for use as biological control agents. These plant-eating insects include a root-mining weevil (*Hylobius transversovittatus*), two leaf-feeding beetles (*Galerucella californiensis* and *Galerucella pusilla*) and flower-feeding beetles (*Nanophyes*). Their potential impact to non-target species is considered to be low.

Chemical Control

The primary control season is mid-July through mid-August. Plants are treated with the herbicide Rodeo® (aquatic label glyphosate), with a concentration of active ingredient of 10% in water. Flowering heads should be removed. If early enough in July, and the plants are not beginning to make seed, the inflorescence can be discarded on the ground. If seed production has already begun, the inflorescence must be bagged and removed from the site.

Herbicide solution should be applied to the cut end of the stem. It is easier to do this with a brush or sponge applicator than a handheld sprayer if overspray is a concern.

Alternatively, plants can be sprayed with a foliar application (100% coverage) of 2% Rodeo[®] solution or spot sprayed with a 10% solution of Rodeo[®].

Management Options

Purple loosestrife is currently at a manageable level, but it is possible with climate change and other season variables that the population levels could surpass a controllable level. Because it is already established, it will be hard to totally eradicate. Efforts should still be continued using chemical and biological control. Monitoring every August (when the flowers are present) should be carried out to determine movement and effectiveness of control efforts.

Spotted Knapweed (*Centaurea biebersteinii*)

Description

Spotted knapweed is a biennial or short-lived perennial. Its name is derived from the spots formed by black margins on the flower bract tips. Spotted knapweed typically forms a basal rosette of leaves in its first year and flowers in subsequent years. Rosette leaves are approximately 8 inches long by 2 inches wide, borne on short stalks, and deeply lobed once or twice on both sides of the center vein, with lobes oblong and wider toward the tip. The taproot is stout and deep. Flowering stems are erect, 8 to 50 inches tall, branched above the middle, and sparsely to densely hairy. Stem leaves alternate along the stem, are unstalked, and may be slightly lobed, or linear and unlobed. Leaf size decreases towards the tip of the stem.



Flowers are purple to pink, rarely white, with 25 to 35 flowers per head. Plants bloom from July to frost, and flower heads usually remain on the plant. Flower heads are oblong or oval shaped, ¼ inch wide and ½ inch across, and are single or borne in clusters of two or three at the branch ends. Leaf-like bracts surrounding the base of the flower head are oval and yellow green, becoming brown near the base. The margins of these bracts have a soft spine like fringe, with the center spine being shorter than the lateral spines. The brown, oval seeds are 1/16 to 1/8 inch long, with pale longitudinal lines and a short fringe on one end.

Ecological Threat

Spotted knapweed infests a variety of natural and semi-natural habitats including barrens, fields, forests, prairies, meadows, pastures, and rangelands. It out-competes native plant species, reduces native plant and animal biodiversity, and decreases forage production for livestock and wildlife. Spotted knapweed may degrade soil and water resources by increasing erosion, surface runoff, and stream sedimentation. It has the potential to invade all open sandy areas and roadsides.

Habitat

Spotted knapweed is found at elevations up to and over 10,000 feet and in precipitation zones receiving 8 to 80 inches of rain annually. Spotted knapweed prefers well-drained, light-textured soils that receive summer rainfall, including open forests and prairie habitats. Disturbance allows for rapid establishment and spread; however, spotted knapweed is capable of invading well managed rangelands. Spotted knapweed does not compete well with vigorously growing grass in moist areas. In seasonally dry areas, spotted knapweed's taproot allows it to access water from deep in the soil, beyond the reach of more shallowly rooted species.

Status in Wisconsin

Restricted - Invasive species that are already established in the state and cause or have the potential to cause significant environmental or economic harm or harm to human health and include established nonnative fish and crayfish, fish in the aquaculture trade, fish in the aquarium trade, and non-viable fish species.

Distribution on the Island

First appeared around 2009 and was located in isolated patches in town and along most other roads on the island. Highest densities are seen near town and appear to be less abundant traveling away from town.

Past Control Efforts

No specific control has been done on spotted knapweed. However routine mowing has kept it at a manageable level.

Background

Spotted knapweed was introduced to North America from Eurasia as a contaminant in alfalfa and possibly clover seed, and through discarded soil used as ship ballast. It was first recorded in Victoria, British Columbia, in 1883 and spread further in domestic alfalfa seeds and hay before it was recognized as a serious problem.

Mobility/Spread

Spotted knapweed plants in North America generally live 3 to 7 years but can live up to nine years or longer. Plants regrow from buds on the root crown. Reproduction is by seed, and plants are capable of producing 500-4,000 seeds per square foot per year. About 90% of the seeds are viable at the time of dispersal, and they can remain viable in the soil for 5-8 years. Most seeds are dispersed near the parent plant but can be transported by people, wildlife, livestock, vehicles, and in soil, crop seed, and contaminated hay. Gravel pits, soil stockpiles and equipment yards are important seed distribution points.

Manual and Mechanical Control

Small infestations of spotted knapweed can be controlled by persistent hand-pulling done prior to seed set. Gloves should be worn because of the possibility of skin irritation. Because spotted knapweed can regrow from the base, care must be taken to remove the entire crown and taproot.

Biological Control

A variety of natural enemies are used as biological control agents for large infestations of spotted knapweed. Most biocontrol techniques use insect larvae to damage the root, stem, leaf, or flower. Two species of seed head flies, *Urophora affinis* and *U. quadrifasciata*, are well-established on spotted knapweed. The larvae of these species reduce seed production by as much as 50% by feeding on spotted knapweed seed heads and causing the plant to form galls. Three moth species (*Agapeta zoegana*, *Pelochrista medullana*, and *Pterolonche inspersa*) and a weevil (*Cyphocleonus achates*) that feed on spotted knapweed roots have also been released. However there is still some question as to the effectiveness of these species in the upper Midwest.

The collective stress on the plant caused by these insects reduces seed production and may lead to reduced competitiveness. Biological control agents may be more effective when combined with other control methods such as herbicides, grazing, and revegetation with desirable, competitive plants.

Chemical Control

Control of spotted knapweed infestations using three chemical herbicides (2,4-D, clopyralid, and picloram) has been reported but is problematic. Existing plants can be killed with 2,4-D but it needs to be reapplied yearly to control new plants germinating from seed stored in the soil. Picloram (Tordon®) is a more persistent herbicide and has controlled knapweed for three to five years when applied during bolt or bud growth stage. Picloram (a restricted-use herbicide) may pose a risk of groundwater contamination where soils are permeable, particularly where the water table is shallow. Milestone® (active ingredient aminopyralid) has been demonstrated as successful against knapweeds and poses less of a threat to groundwater contamination.

In the absence of desirable native grasses, longevity of control may be increased by revegetating with competitive grasses and forbs.

Other methods:

Long-term grazing by sheep and goats has been found to control spotted knapweed. Burning, cultivation, and fertilization typically are not effective on spotted knapweed unless combined with other methods of control.

Management Options

The most cost effective management strategy for spotted knapweed is to prevent its spread to non-infested areas. Spread by seed can be minimized by avoiding travel through infested areas; by cleaning footwear, clothing, backpacks, and other items after hiking through infested areas; by cleaning mowing and construction equipment; and by using weed free mulch. In most control settings, it will likely be necessary to use herbicide to control the plant. When ever practical though, hand pulling and other alternative methods should be considered.

Tansy (*Tanacetum vulgare*)

Description

Tansy is an herbaceous perennial that grows 2-5 feet tall. It is erect and unbranched except for the flowering head. Stems are slightly hairy, woody, and purplish red near the base. The leaves are alternating and 2-2.5 inches long with a width of about an inch. Leaves also tend to be strongly aromatic when crushed. Flowers are flat-topped in clusters of bright yellow and looks like button-like discs, usually appearing July-October.

Ecological Threat

Tansy is unpalatable to grazing animals, and contains alkaloids that are toxic to both livestock and humans if consumed in large quantities.

Habitat

Tansy is an invader of well-drained or sandy soils in prairies, fields, pastures, and roadsides.

Status in Wisconsin

Restricted – Invasive species that are already established in the state and cause or have the potential to cause significant environmental or economic harm or harm to human health and include established nonnative fish and crayfish, fish in the aquaculture trade, fish in the aquarium trade, and non-viable fish species.

Distribution on the Island

Tansy is found along all of the main roads on the island. Tansy is found in the highest densities around the town of La Pointe. Traveling farther from town, tansy appears to be less abundant. Northshore Road only has one known patch of tansy.

Past Control Efforts

No specific control has been done on tansy other than routine roadside mowing.

Background

Tansy is native to Eurasia and was brought to the U. S. in colonial times for medicinal and horticultural purposes. Over time, it has escaped gardens and naturalized along roadsides, railroads, waste areas and along streams throughout much of the northern U. S. and southern Canada.

Mobility/Spread

Seeds are dispersed via wind, water, and through road side mowing. Roots can also be spread vegetatively, forming new plants from very small root fragments.

Manual and Mechanical Control

Cutting or mowing prior to flowering in order to prevent seed dispersal is essential to prevent seeds from spreading. Remove dead vegetation with controlled burns to make the plants easier to target with herbicides.

Biological Control

There is currently no known feasible way of controlling tansy with biological control.

Chemical Control

Use a foliar spray with metsulfuronmethyl, imazapyr, glyphosate, or 2,4-D in the spring.

Management Options

Tansy has spread throughout Madeline Island farther than most other invasive plants. This is largely because there has been no previous management of the plant. Tansy has most likely been planted intentionally in numerous places because of its desired bright yellow flowers. Without targeted control of the plant, there has been a very large spread of the plants seeds by both humans and natural processes. If no action is taken, the tansy will continue to spread at a very rapid rate until all of the roads on the island are lined with the plant. As the plant spreads along the roads, seed dispersal will take place in open areas and gradually spread into other sensitive areas of the island.



To control tansy on Madeline Island, efforts should be focused in the early part of the summer. Spraying known patches of tansy as soon as plants are able to be identified should be the first step. Remaining plants should be cut down before plants seeds are able to be dispersed.

Japanese Knotweed (*Polygonum cuspidatum*)/Giant Knotweed (*Polygonum sachalinense*)

Description

Knotweed can reach up to 9-15 feet tall and form large vegetative colonies. The plant stems are semi-woody and hollow with distinct raised nodes similar to bamboo canes. Leaves are alternate and simple. Leaves come to a pointed tip and are dark green. Size of leaves on Japanese Knotweed is usually 4-6 inches long and can have a squared-off base. Giant Knotweed leaves can be twice the size of the Japanese knotweed leaves. Flowers appear greenish white and bloom in late summer. The root system can grow up to 10 feet deep and create a dense impenetrable layer.



Ecological Threat

Knotweed can pose a significant threat to riparian areas where it eliminates other vegetation and causes erosion. The plant can also break through pavement and building foundations.

Habitat

Knotweed can invade forest edges, wetlands, fields, roadsides, and urban areas.

Status in Wisconsin

Restricted – Invasive species that are already established in the state and cause or have the potential to cause significant environmental or economic harm or harm to human health and include established nonnative fish and crayfish, fish in the aquaculture trade, fish in the aquarium trade, and non-viable fish species.

Distribution on the Island

Knotweed is considered to be at a manageable level right now. Only four small populations are known to occur on the island. Two populations are on South Shore Rd. Both of the landowners have agreed to allow the town of La Pointe and MIWP to remove the invasive plants. Two other populations are known to be located in the town of La Pointe. One location is near the public library and the other is at the Madeline Island Yacht Club. The landowner by the library has agreed to cut the plants down by the fall of 2013 while the Yacht club has allowed the town La Pointe and MIWP to remove the invasive plants. No other populations are known to occur on the island.

Past Control Efforts

The population on South Shore Rd. has been repeatedly cut down by the landowner for several years while the population has slowly expanded. In the summer of 2012 and 2013, use of herbicide has been implemented by the town and MIWP. In the summer of 2013, control consisted of large plants being cut and stump treated. Cut plants were then removed from the site and disposed of properly. Seedlings were then sprayed.

The two populations in town have also been removed as of 2013. Plants at the marina were cut and treated and no re-sprouts were observed. The population near the library on private property was also cut by the landowner and the cuttings were allowed to be taken away and disposed of properly. It is unclear what if any precautions were used to avoid re-sprouting at the site.

Background

knotweed is originally from Japan, China, and North Korea, where it invades newly exposed soils. It entered Europe in the 1840s and made its way to the east coast of the United States by the late 1800s. It first made its appearance in Wisconsin around the 1960s.

Mobility/Spread

Young plant stems can produce new shoots if buried, on floating water, or even on moist soil.

Manual and Mechanical Control

Young plants can be hand pulled. Plants and leaves should be burned or bagged and placed in a landfill. Another option is also to mow multiple times per growing season for several years.

Biological Control

There is currently no known feasible way of controlling Knotweed with biological control.

Chemical Control

Plants are most susceptible to herbicides if they are cut when 4-5 feet tall and the regrowth is treated around 3 feet tall. Foliar spraying should be done with aminopyralid, imazapyr, glyphosate, or triclopyr. Cut stump treatments can be done with glyphosate or triclopyr.

Management Options

To control knotweed on Madeline Island, it should be a priority for the town of La Pointe and the MIWP to work with the landowners of the existing populations of this plant. Monitoring and control as needed should be continued on both plant populations until the plant is believed to be eradicated. Several years of monitoring should continue after the eradication to ensure seedlings don't return.

Leafy Spurge (*Euphorbia esula*)

Description

Herbaceous perennial with deep root system and milky sap in stem, flowers, and leaves. Sap is distasteful to some animals and can cause blistering in mouths or throats. Grows 0.5-3' feet tall. Leaves are alternate and long with a blue-green color. Flowers are small and yellow-green surrounded by cup-shaped bracts. Flowers are paired, with 7-10 pairs clustered in umbels at tops of stems. Usually blooms in late spring through mid-summer.



Ecological Threat

This plant is most aggressive where soil moisture is limited. The plant can quickly create monospecific stands which exclude native vegetation and reduce wildlife habitat value.

Habitat

Leafy spurge can invade oak savannas, prairies, fields, pastures, and roadsides.

Status in Wisconsin

Restricted - Invasive species that are already established in the state and cause or have the potential to cause significant environmental or economic harm or harm to human health and include established nonnative fish and crayfish, fish in the aquaculture trade, fish in the aquarium trade, and non-viable fish species.

Distribution on the Island

After monitoring in the summer of 2013, two populations of leafy spurge have been identified. One population is located along Middle Road and the other population is near "The Pub" restaurant. The population on Middle Road is along the road side and therefore on public ground. The necessary landowners for the population near "The Pub" were contacted and permission was given to control leafy spurge.

Past Control Efforts

There has been no specific action taken to control leafy spurge before 2013.

Background

Leafy spurge was transported to the United States possibly as a seed impurity in the early 19th century. First recorded from Massachusetts in 1827, leafy spurge spread quickly and reached North Dakota within about 80 years. It now occurs across much of the northern U.S., with the most extensive infestations reported for Montana, North Dakota, Nebraska, South Dakota, and Wyoming.

Mobility/Spread

Plant reproduces readily from seed. Mature seed pods disperse seeds explosively, expelling seeds up to 20 feet away. Root fragment as deep as 9' in the soil can give rise to new plants.

Manual and Mechanical Control

It is possible to hand pull or dig the plant from the soil; however, extreme care should be taken to ensure the entire root system is removed.

Biological Control

Biological control can be effective. Both specific beetles and also livestock have proven effective to control leafy spurge.

Chemical Control

Foliar spraying with either aminopyralid or imazapic has produced the best results.

Management Options

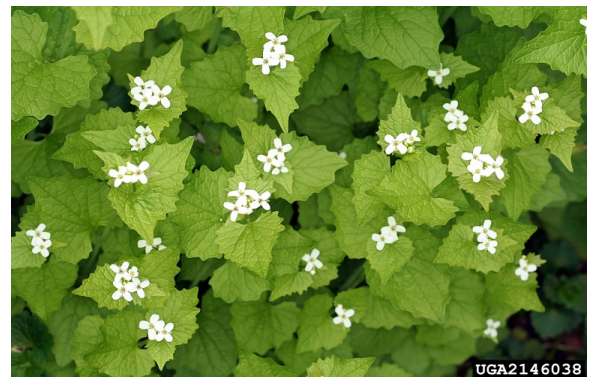
Before 2013, leafy spurge had not been documented on Madeline Island. However, after talking to landowners, it appears the plant has been here for at least several years. Luckily, the plant appears not to have spread to a point where it would not be manageable. Immediate action should be taken to treat and monitor the two known populations to keep the plant from spreading. More effort in monitoring should follow to find any possible other populations.

Garlic Mustard (*Alliaria petiolata*)

Description

Garlic mustard is a cool season biennial herb with stalked, triangular to heart-shaped, coarsely toothed leaves that give off an odor of garlic when crushed. First-year plants appear as a rosette of green leaves close to the ground. Rosettes remain green through the winter and develop into mature flowering plants the following spring. Flowering plants of garlic mustard reach from 2 to 3-½ feet in height and produce buttonlike clusters of small white flowers, each with four petals in the shape of a cross.

Recognition of garlic mustard is critical. Several white-flowered native plants, including toothworts (*Dentaria*), sweet cicely (*Osmorhiza claytonii*), and early saxifrage (*Saxifraga virginica*), occur alongside garlic mustard and may be mistaken for it.



Beginning in June, seeds are produced in erect, slender pods and become shiny black when mature. By late June, when most garlic mustard plants have died, they can be recognized only by the erect stalks of dry, pale brown seedpods that remain, and may hold viable seed through the summer.

Ecological Threat

Garlic mustard poses a severe threat to native plants and animals in forest communities in much of the eastern and midwestern U.S. Many native wildflowers that complete their life cycles in the springtime (e.g., spring beauty, wild ginger, bloodroot, Dutchman's breeches, hepatica, toothworts, and trilliums) occur in the same habitat as garlic mustard. Once introduced to an area, garlic mustard outcompetes native plants by aggressively monopolizing light, moisture, nutrients, soil and space. Wildlife species that depend on these early plants for their foliage, pollen, nectar, fruits, seeds and roots, are deprived of these essential food sources when garlic mustard replaces them. Humans are also deprived of the vibrant display of beautiful spring wildflowers.

Habitat

Garlic mustard frequently occurs in moist, shaded soil of river floodplains, forests, roadsides, edges of woods and trails edges and forest openings. Disturbed areas are most susceptible to rapid invasion and dominance. Though invasive, garlic mustard does not tolerate high soil acidity. Growing season inundation may limit invasion of garlic mustard to some extent.

Status in Wisconsin

Restricted - Invasive species that are already established in the state and cause or have the potential to cause significant environmental or economic harm or harm to human health and include established nonnative fish and crayfish, fish in the aquaculture trade, fish in the aquarium trade, and non-viable fish species.

Distribution on the Island

Garlic mustard is not known to currently exist on the island.

Past Control Efforts

Garlic mustard has not yet been detected. Early summer surveys for invasive plant species should be conducted to help detect the new arrival of species like garlic mustard.

Background

Garlic mustard was first recorded in the United States about 1868, from Long Island, New York. It was likely introduced by settlers for food or medicinal purposes.

Mobility/Spread

A single plant can produce thousands of seeds, which scatter as far as several meters from the parent plant. Depending upon conditions, garlic mustard flowers either self-fertilize or are cross-pollinated by a variety of insects. Self-fertilized seed is genetically identical to the parent plant, enhancing its ability to colonize an area. Although water may transport seeds of garlic mustard, they do not float well and are probably not carried far by wind. Long distance dispersal is most likely aided by human activities and wildlife. Additionally, because white-tailed deer prefer native plants to garlic mustard, large deer populations may help to expand it by removing competing native plants and exposing the soil and seedbed through trampling. Deer are also thought to move seeds in contaminated soil.

Manual and Mechanical Control

Hand removal of plants is possible for light infestations and when desirable native species co-occur. Care must be taken to remove the plant with its entire root system because new plants can sprout from root fragments. This is best achieved when the soil is moist, by grasping low and firmly on the plant and tugging gently until the main root loosens from the soil and the entire plant pulls out. Pulled plants should be removed from site if at all possible, especially if flowers are present.

For larger infestations of garlic mustard, or when hand-pulling is not practical, flowering stems can be cut at ground level or within several inches of the ground, to prevent seed production. If stems are cut too high, the plant may produce additional flowers at leaf axils. Once seedpods are present, but before the seeds have matured or scattered, the stalks can be clipped, bagged and removed from the site to help prevent continued buildup of seed stores. This can be done through much of the summer.

Biological Control

Researchers are investigating potential biological control agents for garlic mustard which may greatly improve the control of this insidious weed. Biocontrol organisms are currently in quarantine facilities in the U.S.

Chemical Control

For very heavy infestations, where the risk to desirable plant species is minimal, application of the systemic herbicide glyphosate (e.g., Roundup®) is also effective. Herbicide may be applied at any time of year, including winter (to kill overwintering rosettes), as long as the temperature is above 50 degrees F. and rain is not expected for about 8 hours. Extreme care must be taken not to get glyphosate on desirable plants as the product is non-selective and will kill almost any plant it contacts. Spray shields may be used to better direct herbicide and limit non-intentional drift.

Other methods:

Fire has been used to control garlic mustard in some large natural settings, but because burning opens the understory, it can encourage germination of stored seeds and promote growth of emerging garlic mustard seedlings. For this reason, burns must be conducted for three to five consecutive years. Regardless of the control

method employed, annual monitoring is necessary for a period of at least five years to ensure that seed stores of garlic mustard have been exhausted.

Management Options

Garlic mustard is an early detection species. Annual monitoring for this species should occur and new populations should be removed immediately.

Any plants that are identified on the island should be immediately eradicated; especially before plants have a chance to complete seed production. The goal is to prevent seed production until the stored seed is exhausted. Seeds of garlic mustard can remain viable in the soil for five years or more, thus effective management requires a long term commitment.